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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,925	01/16/2004	Kiyoshi Satoh	ASMJP.055C1	8224

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EXAMINER

KORNAKOV, MICHAEL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,925

Applicant(s)

SATO ET AL.

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 15-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 15-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06/13/2005 has been entered.
2. Claims 1,6,12 are amended to recite that the dissociated cleaning gas is exposed to aluminum alloy wall of the remote plasma discharge chamber. Claims 1-12, 15-22 are examined on the merits.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because the reference character "24" has been used to designate both monitor 24 (Fig. 1,2) and body (Fig. 4A, 4B) and the reference character "30" has been used to designate both plasma CVD device (Fig.2) and a valve body (Fig. 4B). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement

Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-12, 15-22 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for remote plasma discharge chamber from **anodized** aluminum alloy, does not reasonably provide enablement for remote plasma discharge chamber with aluminum alloy wall. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. The instant specification provides for remote discharge plasma chamber made of anodized aluminum alloy, which is a specific material, the use of which provides certain input into the claimed cleaning process. Claims 2-5, 7-11, 15-22 are rejected because of their dependency.

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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6. Claims 1-8, 12, 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 697 467 in view of Smith et al (U.S. 6,150,628).

The teaching of EP'467 has been discussed in the previous office action and that discussion is fully incorporated here. The disclosure of EP'467 differs from the instant claims by not indicating that dissociated cleaning gas is exposed to an aluminum alloy wall of the remote plasma discharge chamber. EP'467 also does not teach the rates of removing deposits adhered to the chamber walls, as recited in the instant claims 1, 6, 12. However, EP'467 indicates that "any power source that is capable of activating the precursor gas can be used. For example, if an RF power source is used, it can be inductively coupled to the inside of the (remote) chamber" (page 4, lines 36-43).

Smith teaches remote plasma cleaning of CVD chambers, utilizing high efficiency RF power coupling device, which inductively couples power into a remote plasma source, the inside surfaces of which comprise a metal, such as aluminum or a coated metal (e.g. anodized) (Abstract, col.2, lines 34-37; col.4, lines 57-61). Smith also motivates the skilled artisan to employ his method of producing remote plasma for cleaning CVD chambers utilizing the described plasma source in lieu of traditional microwave technique by presenting the number of benefits of using such high efficiency RF power coupling device (paragraph, bridging col.1 and 2; col.9, lines 35-43).

Therefore, one skilled in the art motivated by EP'467 and Smith would have found obvious to utilize remote plasma source of Smith in order to eliminate drawbacks of traditional microwave techniques in the teaching of EP'467 with the reasonable expectation of success.

Regarding the applied energy power, Smith provides an example, wherein the power was approximately 3.5 kW. As to the instantly recited energy power of less than about 3,000 W, EP'467 indicates that the energy power is a result effective parameter by stating that "the power levels and the other processing parameters that are chosen, are system specific and thus they will need to be optimized for the particular system, in which the process is being run. Making the appropriate adjustments in process conditions to achieve optimum of performance for a particular system is well within the capabilities of a person of ordinary skill in the art" (paragraph, bridging col. 7 and 8). Therefore, one skilled in the art motivated by EP'467 would have found obvious to optimize the RF power depending on particular deposits to be removed from the CVD chamber in order to accelerate removal of such deposits within the combined teaching of EP'467 and Smith with the reasonable expectation of success. It is also well settled that discovery of optimum value of result effective variable in known process is ordinarily within the skill in the art and would have been obvious, consult *In re* Boesch and Slaney 205 USPQ 215 (CCPA 1980).

As to the specific limitation of claims 1, 6 and 12, which are concerned with particular rates of removal deposits, it is axiomatic that one who performs the steps of the known process must necessarily produce all of its advantages. Mere recitation of a newly discovered function or property, that is inherently possessed by things in the prior art **does not cause a claim** drawn to these things to distinguish over the prior art, consult *In Re* Leinoff v. Louis Milona & Sons, Inc. 220 USPQ 845 (CAFC 1984). Because the processing steps of the recited cleaning method are fairly suggested by EP'467/Smith,

the result of implementing such steps is reasonably expected within the teaching of EP'467/Smith.

Regarding the flow rates of NF_3 as being between 0.5 slm and 1.5 slm (claims 5, 8) EP'467 indicates that the gas flow rate is a result effective parameters (page 5, lines 54-57) and that making the appropriate adjustments in process conditions to achieve optimum of performance for a particular system is well within the capabilities of a person of ordinary skill in the art.

7. Claims 9-11 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 697 467 in view of Smith et al (U.S. 6,150,628) and in further view of Rajagopalan et al (U.S. 6,274,058).

The teaching of EP'467/Smith remains silent about a valve, positioned on the piping and about the steps of operating the valve during the cleaning procedure. However, the on/off valves are conventionally utilized in the art in order to isolate the remote plasma environment from the processing chamber. Such isolation allows maintaining the plasma remote, while running the processing task in the chamber. Thus, Rajagopalan teaches remote plasma cleaning method for processing chambers, wherein an on/off valve 90 is utilized in order to continue operation of remote plasma generator while not requiring that reactive species be provided to the processing chamber 10. Once the valve 90 is open, the reactive species formed from cleaning gas (NF_3) in the remote plasma generator 60 flow through gas supply line into the chamber interior (col.6, lines 35-44). Rajagopalan also provides a cleaning routine, wherein after

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forming deposits within the processing chamber and removing processed substrates from the chamber a plasma in the remote plasma apparatus is initiated and reactive species flow into the processing chamber through supply line 88 passing the opened valve 90.

Because EP'467/Smith and Rajagopalan are concerned with CVD chamber cleaning, utilizing remote plasma source and Rajagopalan provides benefits of utilizing on/off valve positioned on the piping, connecting remote plasma source with processing chamber, one skilled in the art motivated by Rajagopalan would have found obvious to utilize such valve in order to establish remote cleaning plasma environment while still running CVD processing, thus enhancing output of CVD chamber in the method of EP'467/Smith with the reasonable expectation of success.

Regarding the specific limitation of claims 10 and 21, which is concerned with forming an opening in a path, substantially as wide as internal surfaces of the piping the skilled artisan would have found obvious to form such opening utilizing the on/off valve in order to provide fast release of reactive species into the processing chamber of EP'467/ Rajagopalan, thus enhancing and accelerating its cleaning with the reasonable expectation of success.

Regarding the specific limitation of claims 10 and 21, which is concerned with withdrawing a valve body, it is noticed here that the valve body represents a structural limitation of the valve. It is noted here that the recitation of specific structural limitations of apparatus in process claim for performing processing steps, wherein the structural limitations of apparatus do not present manipulative difference between the claimed

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process steps and the prior art process, do not serve to limit the claim. See, e.g., In re Otto, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963). Furthermore, one skilled in the art would have found obvious to completely open the pass for flowing plasma species into CVD chamber in order to maximize the concentration of plasma species within the CVD chamber, thus enhancing its cleaning.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Kornakov
Primary Examiner
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06/24/2005

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